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Plug-In Electric Vehicles – A Utility Perspective

John Gilbrook, US Lead, AFV Transportation

Agenda

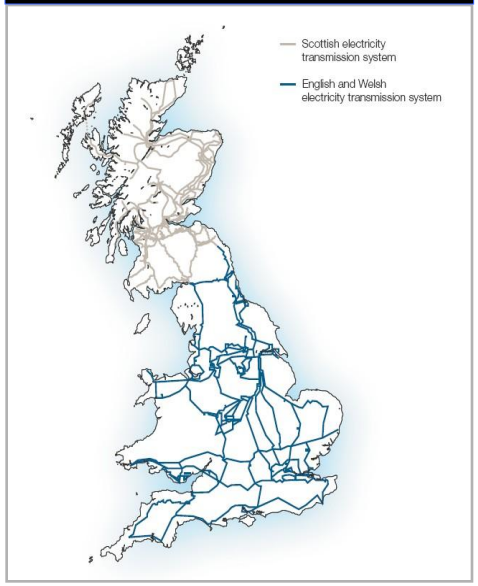
- **Who is National Grid?**
- What do we expect for PEV adoption?
- What are we doing about it?

National Grid

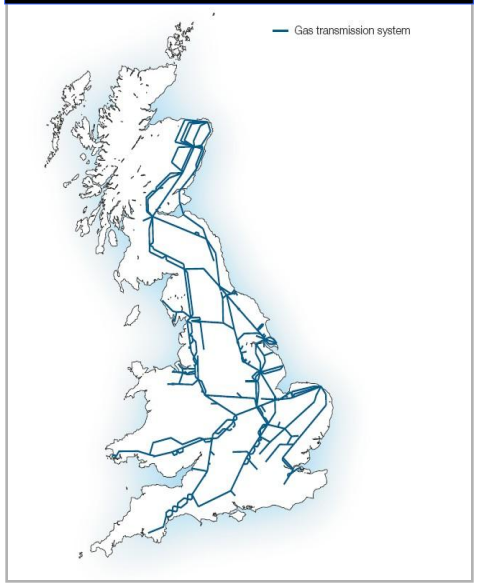
… Transmission

- National Grid owns the high-voltage electricity transmission system in England and Wales and operates the system across Britain.
- National Grid also owns and operates the high-pressure gas transmission system in Britain.
- National Grid is one of the leading electricity transmission owners in the Northeast US.

Electricity Transmission – UK



Gas Transmission – UK



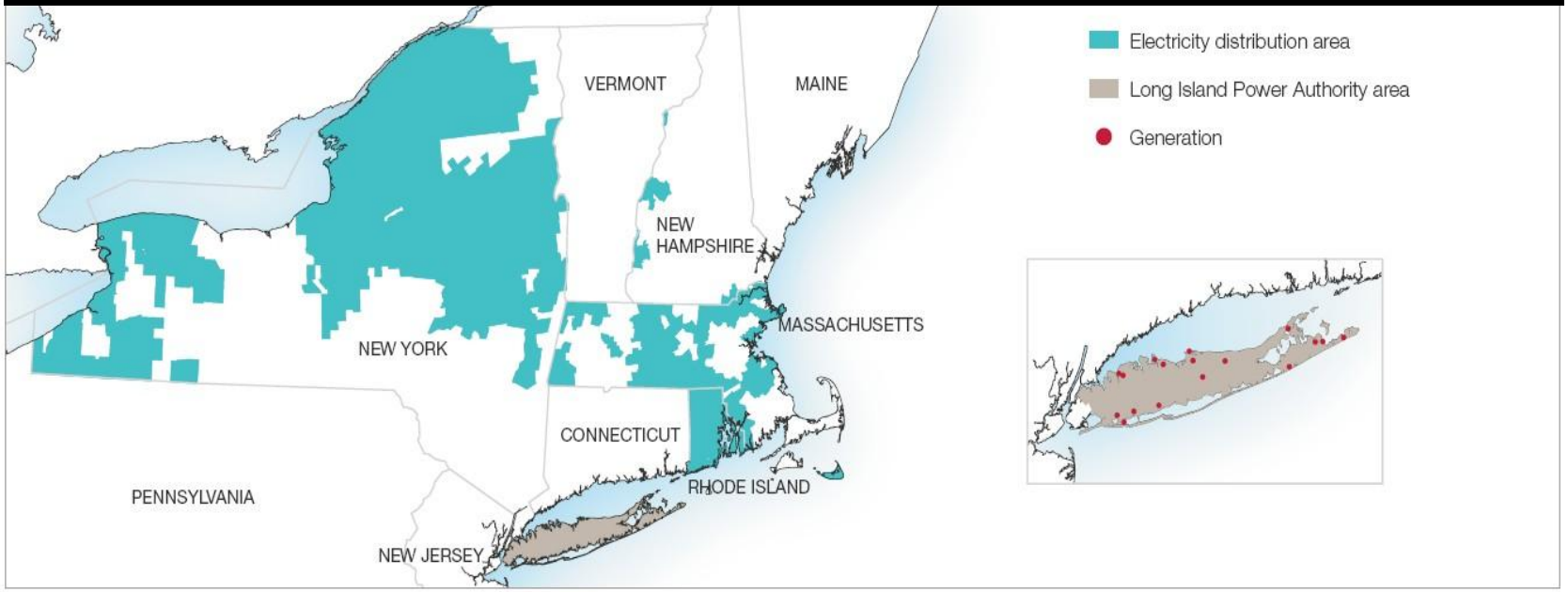
Electricity Transmission – US

National Grid

… Electricity Distribution and Generation

- National Grid is one of the largest electricity distribution and generation companies in the Northeast US as measured by the electricity delivered (61 TWh), and number of electricity distribution customers (3.4 million).

Electricity Distribution & Generation



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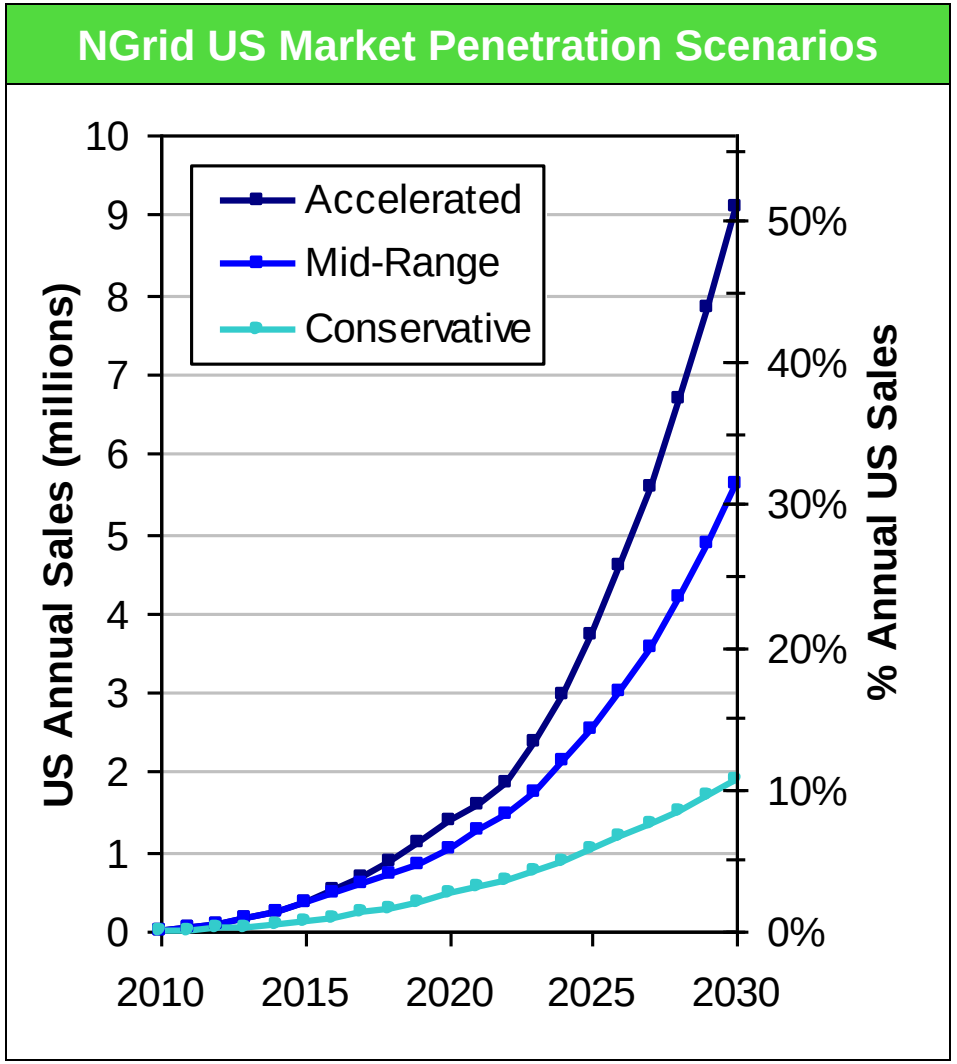
Factors driving PEV adoption

- High and volatile gasoline prices
- Greater concern for the environment (climate change)
- Emphasis on reducing petroleum imports (national security)
- Improvements in energy storage technologies (Li-ion batteries)
- Significant government support

Customer familiarity of hybrid-electric vehicles (HEVs) should facilitate the introduction of PEVs

Anticipated Market Penetration

- PEVs are being introduced in limited quantities, in targeted regional markets, starting in 2010 and 2011
- More widespread availability is not likely before 2012
- HEVs took about 10 years to reach 2-3% of new car sales in the US.
- Diesel cars in Europe achieved 20-50% share of new car sales (depending on the country) over a 20-year period.



Grid assessment with PEV charging

Generation

- Expectation is that there is sufficient generation capacity for millions of plug-in vehicles

Transmission

- Expectation is that millions of vehicles can be accommodated on the transmission grid
- Incremental load in congested areas would need to be addressed

Distribution

- Generally sufficient capacity, but the concern is within local areas where several neighbors purchase PEVs (“clustering”)
- Clustering will create loads on specific portions of the distribution system which would create challenges, even when overall PEV market penetration remains low.
  - Additional loading of transformers could degrade their life
  - Overloading of transformers could lead to failures

This assumes that the bulk of charging is off-peak

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Plug-In Electric Vehicle Progress

- In 2010 New Products and Services adopts a “Transportation” function
  - To engage customers on transportation topics
  - Monitor PEV sector and evaluate approach
- In 2011 Customer and Business Strategy chooses AFV as one of five “priority sectors” for strategy development
  - Evaluate Customer requests and prioritize business opportunities
    - Including EV Rates/Tariffs, Ownership of charging stations residential/commercial, incentives, vendor partnerships.

AFV Strategy

- New AFV Strategy Statement
  - *"National Grid will offer tailored rate plans, educational resources, and project funding assistance in order to facilitate the adoption of alternative fuel vehicles"*

- New AFV Vision Statement
  - *"National Grid will provide customers with trusted advice and streamlined solutions to enable access to clean, efficient transportation options as markets and technologies evolve"*

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PEV Sector Engagement

- National Grid's US heritage is deeply rooted in the AFV space yet more significantly with natural gas vehicles
- Through AFV related partnerships like the DOE Clean Cities it was a natural next step to parallel that engagement with plug-in electric technology.

U. S. Department of Energy

Organizations and Advocacy

- Although National Grid has a long standing history in the AFV space our CUSTOMERS have necessitated our current position.

- Because of them and their interests we now actively participate in these groups on AFV matters

PEV Infrastructure Projects

- ***33 Charging Stations in MA electric territories***
  - Partnerships with The 99 Restaurant, Chili's, municipalities, and shopping malls
  - 2 Year lease, Host pays for electricity
  - Funded through Coulomb/DOE ChargePoint America
- ***65 Charging Stations in Upstate NY electric territories***
  - Partnerships being finalized now but expected to include universities, municipalities, retail and shopping
  - 4 Year lease, Host pays for electricity
  - Funded through NYSERDA PON 2301 (largest award)
- ***50 Charging Stations in RI -- "Top 50" Project***
  - Partnerships expected
  - Lease expected
  - Private funding expected

Infrastructure Experiences

- *“Right tool for the job”*
  - AFV success is typically dependent on upfront costs. By choosing the correct EVSE project success can be significantly increased
- “*Keep an open mind when choosing a location”*
  - Locating an EVSE in highly visible locations can significantly increase cost.
- *“Nothing is more valuable than enthusiastic partners ”*
  - Most installation project fail due to lack of commitment from site host or partner.

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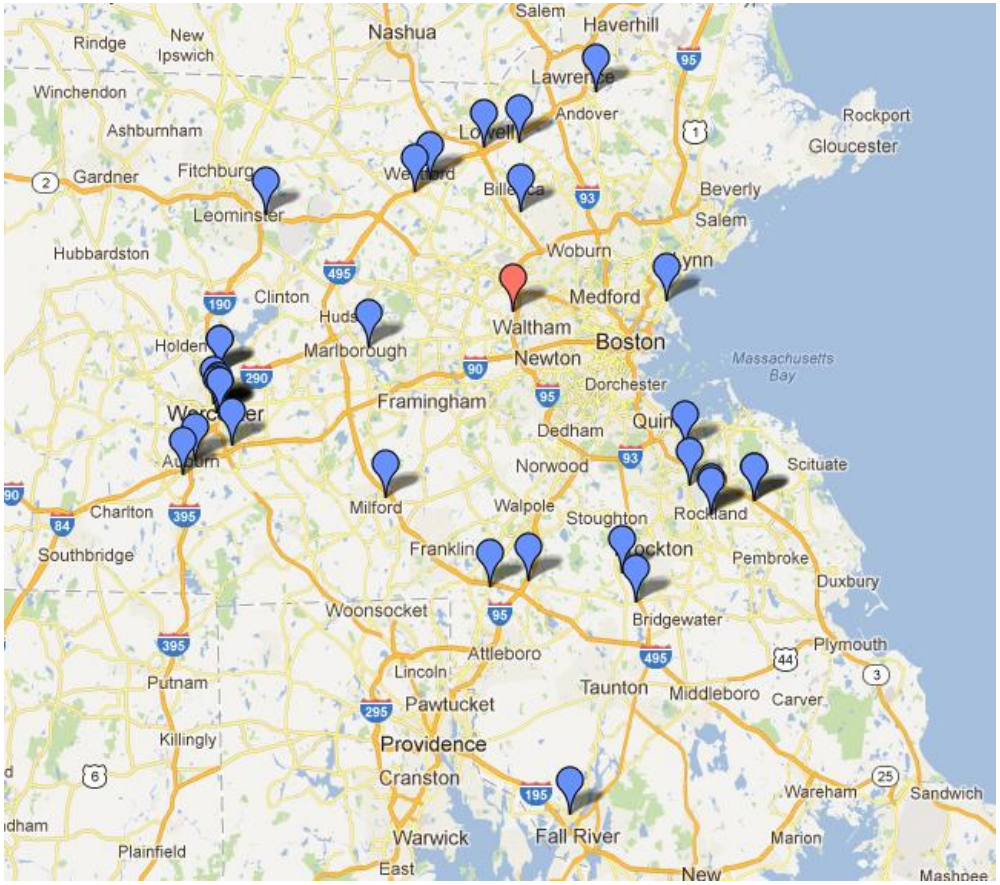
Massachusetts EVSE Pilot



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PEV Technology Projects (Vehicles)

- 2009-2012 Ford Escape, Plug-In Hybrid test program

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U.S. DEPARTMENT OF ENERGY
Ford
Johnson Controls
SAFT

- 2011-2014 GM Chevy Volt test program

EPRI ELECTRIC POWER RESEARCH INSTITUTE
GM

- 2011-2014 Chrysler Dodge Ram Plug-In Hybrid test program

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Questions and Contact

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